# Class Act:

## An Assessment of Los Angeles Metro's U-Pass Program


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**16. Abstract**
In 2016, the Los Angeles County Metropolitan Transportation Authority (Metro) introduced the Universal College Student Transit Pass (U-Pass), its reduced transit fare pass program for college and university students, with the expressed goal of increasing student transit ridership. An increase in college student transit ridership has great potential in Los Angeles County, where public transit ridership is declining, traffic congestion is worsening, and over one million students are enrolled in postsecondary education at public institutions. Researchers have found that reduced transit fare pass programs for university students are successful in increasing student transit use, generally with modest operational costs imposed on transit agencies. Is this true for U-Pass? A relatively young program, U-Pass raises questions for Metro staff about added costs and service demand on Metro buses and trains in exchange for increased ridership and student savings. Using ridership and survey data from the first two years of U-Pass, this research explores the relationships between U-Pass and student transit ridership, service demand and operating costs, and fare revenue.


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# Executive summary

The Los Angeles County Metropolitan Transportation Authority, or "Metro," is the largest public transit operator in the Los Angeles region and third largest in the United States, serving 384 million passengers in 2018. In 2016, Metro introduced the Universal College Student Transit Pass (U-Pass), its reduced transit fare pass program for college and university students, with the expressed goal of increasing student transit ridership. An increase in college student transit ridership has great potential in Los Angeles County, where public transit ridership is declining, traffic congestion is worsening, and over one million students are enrolled in postsecondary education at public institutions.

Researchers have found that reduced transit fare pass programs for university students are successful in increasing student transit use and reducing trips by private automobile to campus, generally with modest operational costs imposed on transit agencies. A relatively young program, U-Pass raises questions for Metro staff about added costs and service demand on Metro buses and trains in exchange for increased ridership and student savings, specifically:

1. Has U-Pass increased transit use among college students at participating institutions?
2. If so, has increased service demand also increased operating costs for LA Metro?
3. How has U-Pass affected LA Metro fare revenue?

Using Metro ridership and survey data, I find that U-Pass is fulfilling its promise of increasing student transit ridership. One out of five U-Pass participants did not ride Metro before the program. However, student participation varies drastically between participating institutions. I find evidence of adverse selection in the U-Pass program, where occasional transit riders are less likely to opt in to the pass as its price increases, creating a feedback loop of declining student participation and increasing prices to cover a relatively small group of frequent transit users (see Figure).

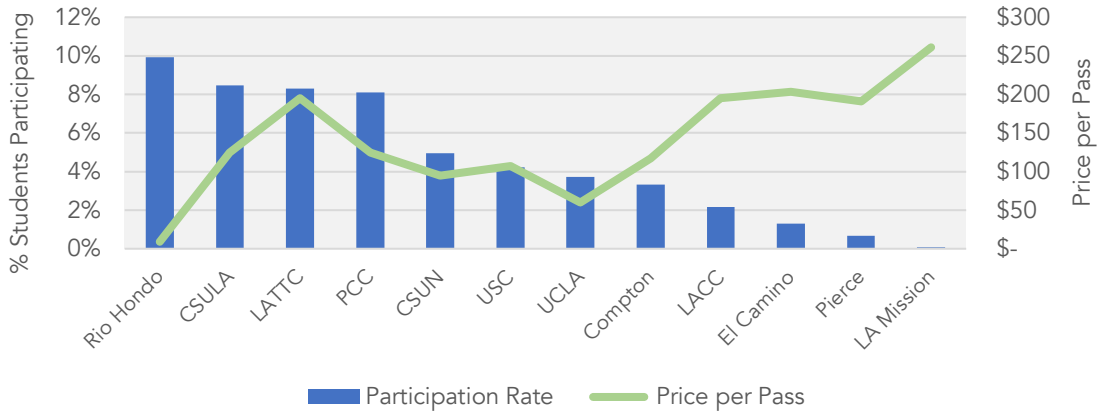



Figure: Student participation in U-Pass generally declines as prices increase to cover a small group of frequent transit riders, Spring 2018

In interviews with Metro service planning staff and three case studies of participating institutions, I find the introduction of U-Pass typically results in limited changes in service on lines accessing institutions; U-Pass' influence on Metro's operating costs varies by institution, but is usually relatively modest. As Metro expands its rail network and improves service in the long term, U-Pass can increase ridership among college and university students without major service changes or capital investments in the short term.

Increased ridership under U-Pass, however, does not translate to higher fare revenue for Metro. Because the majority (55%) of U-Pass participants previously paid Metro's full transit fare, and students generally ride as frequently as they did before joining the program, Metro receives less fare revenue under U-Pass than it would under participants' previous travel and payment behavior – even with the addition of new riders.

With thoughtful policy interventions, Metro will not have to choose between U-Pass ridership and revenue. I recommend that Metro aim to lower the U-Pass participation barriers to (1) continue to increase transit ridership and (2) mitigate or recoup the revenue lost from existing transit riders who take advantage of reduced fares under U-Pass. These recommendations include (1) implementing U-Pass as a universal program at participating institutions, (2) providing institutions a communications toolkit for better marketing U-Pass, and (3) securing state funding for U-Pass subsidies. By better capturing new and occasional transit riders, Metro and its partnering academic institutions can support U-Pass in reaching its full potential in increasing student transit ridership.

# Introduction

Los Angeles, California, a region popularly regarded as a "driving city," is also home to the United States' third largest public transit agency by ridership: the Los Angeles County Metropolitan Transportation Authority, or "Metro." Every day, over one million people travel on Metro's bus, light rail, and subway lines. Despite significant investments in the transit system, Metro's ridership has been declining since the late 2000's. While major capital expansions, such as the Purple Line subway extension to the Westside, aim to increase ridership in the long term, Metro must also consider actions it can take to increase ridership in the short term.

In this report, I focus on college and university students as untapped potential for transit ridership in Los Angeles County. Researchers have found that reduced transit fare pass programs for college and university students increase transit use and decrease personal automobile trips to campus. And fare pass programs, unlike major capital improvements, can be implemented over the course of months, not years, resulting in increases in transit ridership in the short term. An increase in student transit ridership has great potential in Los Angeles County, where public transit ridership is declining, traffic congestion is worsening, and over one million students are enrolled in postsecondary education at public institutions.

In 2016, Metro, the largest public transit operator in the Los Angeles region, launched the Universal College Student Transit Pass (U-Pass) program, a reduced transit fare pass program. Under U-Pass, Metro charges partnering colleges and universities $0.75 per ride taken by participating students, a savings of $1.00 over the full cash transit fare of $1.75. The participating institutions determine how to administer and subsidize the program. As U-Pass enters its third year in operation, now is an appropriate time to examine the performance of this relatively young program. U-Pass raises questions about costs and service demand placed on Metro in exchange for student savings, specifically:

1. Has U-Pass increased transit use among college students at participating institutions?
2. If so, has increased service demand also increased operating costs for LA Metro?
3. How has U-Pass affected LA Metro fare revenue?

I explore these questions in this report by first conducting a literature review on student transit pass programs. Then, I provide an overview of the history and mechanics of the U-Pass program. I then analyze Metro ridership and survey data, and discuss my findings and their implications. My findings lend to policy recommendations that I offer to improve student participation and financial performance of U-Pass. If Metro and its partnering academic institutions were to adopt these recommendations, they would help U-Pass to reach its full potential by increasing student transit ridership.

# What we know about student transit pass programs

Before examining Los Angeles Metro's U-Pass program specifically, it is important to first understand the broader context of student transit pass programs. Why are student transit pass programs important? Under what conditions are pass programs successful in increasing transit ridership? In this section, I explore these questions by summarizing existing literature on student transit pass programs. I find that student transit pass programs benefit students, universities, and transit agencies, but the success of a program generally depends on how the pass is administered to students. Still, I find a need for further assessment of programs like Metro's U-Pass, especially in the context of declining public transit ridership.

## Why consider student transit pass programs in California? Everyone wins…

### *Students: Transportation costs can be a barrier to education*

While tuition and housing are important financial considerations for college and university students, the high financial costs of transportation can also be a barrier to a postsecondary education. Because most college students are not wealthy and typically have far lower earnings than they will later in their lives, college and university students – especially those in urban areas – may face limited housing options near campus. As students live farther away from campus for lower housing costs, their commutes can become longer and more expensive (Allen and Farber 2018). The financial costs of commuting to campus or an internship can be significant: Transportation is the second largest living expense for postsecondary students after housing (The College Board 2018).

Students who live outside walking or bicycling distance to campus must drive, carpool, or ride public transit to access resources on campus. These travel options can prove challenging for students with limited financial resources. Brown, Hess, and Shoup found that owning a car increased the cost of attending college in 2001 by $2,000 per year, which is equivalent to $2,900 in 2019. To some students, the benefits of car ownership – such as access to less expensive housing and regional amenities like medical care, jobs, and friends – may outweigh these costs. Ultimately, however, the high monetary costs of automobile ownership and maintenance restrict car access among low-income individuals (Blumenberg 2017). For example, while most people (95% of all adults) have access to cars in their household, one out of five adults in poverty do not have reliable access to cars (ibid).

Paying for public transit fares presents its own challenges to college and university students. Students who use public transit may not be able to afford the up-front costs

of monthly or academic-term-length transit passes that lower the per trip cost of transit, and instead pay more expensive single ride fares to travel to campus or their jobs (Price and Curtis 2018).

The high monetary costs of transportation can dissuade college and university students from participating in on-campus activities, which are linked to student success (Bozick 2007). A survey of university students in Toronto, for example, found that students with low transportation costs (i.e., those who walked or biked) commuted to campus more frequently than those who drove or used transit (Allen and Farber 2018). The higher the marginal cost of a trip to campus, the researchers found, the lower a student's access to lectures and labs, study groups, library resources, and social events.

### *Colleges and universities: Subsidizing transit is a cost-effective tool in travel demand management*

Large employers, which include colleges and universities, often use a variety of travel demand management measures to reduce commuting to and from campus by driving alone, and increase commuting by alternate means, such as carpooling, biking, and public transit. The environmental and societal benefits of increased transit use and decreased automobile use are well documented. Schweitzer (2017), for example, summarizes how a shift from driving to transit can reduce air, noise, and water pollution. But large employers have more than an altruistic motivation for providing transit passes: Subsidizing transit passes is often less expensive than increasing parking supply.

During the first year of BruinGO, a fare-free transit program at UCLA in the early 2000s, the demand for parking on campus decreased by 1,020 spaces (Brown, Hess, and Shoup 2003). Researchers estimated the annual cost of supplying these spaces in a new parking garage would be $2.7 million (equivalent to $3.8 million in 2019), over three times the annual cost of BruinGO of $810,000 ($1.1 million in 2019) (ibid). Beyond the financial benefits to the suppliers of parking, reducing parking demand on campus can serve a more tangible purpose: Colleges and universities can use land that is not dedicated to parking for other purposes, like academic and research spaces or dormitories (Yu and Beimborn 2018). The University of Illinois at Urbana-Champaign, for example, eliminated 1,000 parking spaces following the introduction of its reduced transit fare program (Brown, Hess, and Shoup 2001).

### *Transit agencies: Students can help reverse the trend of declining transit ridership in California*

Despite significant investments in its transit network, public transit agencies in California and Los Angeles County, specifically, are experiencing a decline in ridership (Manville, Taylor, and Blumenberg 2018). Metro has seen the greatest decline in total passengers of any transit agency in California, from 464 million riders in 2009 to 384 million riders in 2018 (LA Metro 2019). In the face of increasing car ownership rates

among populations more likely to take transit, such as foreign-born and lower-income households, transit agencies in California must effectively serve existing riders *and* attract new riders in order for the state to meet its ambitious environmental goals (Manville, Taylor, and Blumenberg 2018).

College and university students who rarely or never take transit are good candidates to become new transit riders. Compared to older adults, young adults are more likely to use transit due to lifecycle, demographic, and locational factors (Brown, et al. 2016). In Southern California, the college and university student population in Los Angeles County represents great untapped potential in transit ridership: Metro estimates 1.4 million students are enrolled in a public college or university in the county, and under one percent of these students took advantage of the agency's reduced fare college pass programs in 2016 (Deming and Feliciano 2018).

Getting college students to use transit now may have long-lasting effects. As students start to commute to campus by transit, they form mental maps of the transit system and may begin to take it for other trips (Brown, Hess, and Shoup 2001). Smart and Klein (2017) found that exposure to transit during young adulthood is associated with an auto-light lifestyle and greater transit usage later in life. Similarly, Weinberger and Goetzke (2010) found that residents of transit-rich metropolitan areas own fewer cars than would be expected when they move to more suburban areas. By encouraging transit use among college students now, transit agencies in Southern California may foster increased transit use and less reliance on personal automobiles into the future.

## Student transit pass programs have proven to be successful…

### *…in improving student access to school and regional resources*

Studies of high school and college students have found increased attendance and participation at schools among students with transit passes compared to those students without transit passes. The effects on student success, such as grade point average or program completion rates, however, have not been clearly documented in the current literature. A study of high school students in Minneapolis, for example, found that students who were enrolled in the school district's free transit program were absent 18 percent fewer days than those who were not enrolled; however, researchers found no relationship between participation in the transit program and GPA (Fan and Das 2016).

In a study of university students, researchers found that transit riders with transit passes commuted to campus more frequently than those who paid for individual trips (Allen and Farber 2018). Another study found that students tend to use their reduced fare transit passes to access regional social, cultural, and recreational opportunities, including for class field trips (Brown, Hess, and Shoup 2001). Researchers have found those students with lower per trip travel costs access campus more frequently than those with higher travel costs, increasing their access to resources that support academic and social success (e.g., libraries and study groups).

### *…in increasing transit use and reducing commutes by private automobile, with limited operational costs imposed on transit agencies*

The law of demand suggests that reducing transit fares will increase demand for transit service (Litman 2004). By reducing the marginal cost of riding transit through a discounted or free pass, universities and colleges can make transit more attractive to students and, accordingly, reduce the number of trips to campus made in cars. Indeed, numerous studies have shown that reduced fare programs have increased transit use and decreased trips by private automobile among college students:

- Within the first year of the University of Washington's U-PASS program, transit ridership grew 35 percent and vehicle trips to campus decreased by 16 percent (Williams and Petrait 1993).
- At the University of Wisconsin-Milwaukee, transit ridership to campus grew 117 percent and vehicle trips to campus decreased 24 percent within the first year of its UPASS program (Meyer and Beimborn 1998).
- Bus ridership for commuting to campus increased 56 percent and solo driving fell by 20 percent within a year of the introduction of BruinGO at UCLA (Brown, Hess, and Shoup 2003).

Despite its many social and environmental benefits, increased ridership presents a challenge for transit agencies if new riders result in crowding on vehicles, especially during the peak periods. The cost of providing additional service in the peak periods is usually more expensive for transit agencies than in off-peak periods (Taylor, Garrett, and Iseki 2000), and smaller transit agencies may not have a sufficient number of buses to accommodate new student riders (Yu and Beimborn 2018). But because of their frequently out-of-phase schedules (e.g., evening classes, flexible internship hours), college and university students are more likely to ride at off-peak hours than typical transit riders, when more seats are empty and the marginal cost of accommodating new passengers is low or even negligible (Brown, Hess, and Shoup 2001). This new ridership can present transit agencies a win-win situation: College student riders increase revenue *and* are likely to use excess transit capacity, resulting in lower operational costs and subsidies per ride than what may be expected from typical increases in ridership (ibid).

### *…but, the success of a transit pass program is influenced by how the pass is provided*

In a national survey of reduced transit fare programs for college and university students, 40 percent of programs required students to "opt in" to the program by purchasing a term pass through their school (Yu and Beimborn 2018). This purchasing structure presents the challenge of "adverse selection," where students who ride transit frequently are more likely to buy a transit pass, so colleges and universities must price the passes to cover the high average volume of rides (Brown, Hess, and Shoup 2001).

Because of the resulting high cost of the transit pass, occasional riders are less likely to buy a transit pass and ride, and the university charges a higher pass price – or pays a higher subsidy per participant – to cover a large number of rides among a small group of students (ibid).

The other fare programs surveyed by Yu and Beimborn (2018), including the University of Washington's U-PASS, the University of Wisconsin-Milwaukee's UPASS, and UCLA's BruinGO pilot program in the early 2000s, offer universal coverage: every student is issued a transit pass for free or reduced transit rides (often subsidized using parking fees or student fees), and students cannot opt out of the program. Because of the low transaction costs of riding transit under universal coverage (i.e., the marginal cost for a student to ride is often $0.00, and the pass is typically included in the student's university ID), occasional riders are more likely to take part in the program, and participation increases (see, for example, Brown, Hess, and Shoup 2003). With a large ridership base of both frequent and occasional riders, the resulting subsidy per participant under universal coverage is relatively low compared to a program with partial coverage (see Table 1).

| | Partial coverage (opt in) | Partial coverage (opt out) | Universal coverage (cannot opt out) |
|---|---|---|---|
| **Participation** | Low | Medium | High |
| **University subsidy per participant** | High | Medium | Low |

Table 1: Comparison of transit pass coverage options (adapted from Brown, Hess, and Shoup 2001)

## The opportunity: Learning from Los Angeles Metro's U-Pass program

### *Principal findings*

In this literature review, I summarized the transportation challenges students face in accessing their education. The high financial costs of transportation can be a barrier to postsecondary education. Reduced transit fare pass programs for college and university students offer access to campus, work, and other resources linked to student success at a low marginal cost, but the benefits of these programs do not solely extend to students. Universities benefit from less parking demand on congested campuses, and transit agencies benefit from increased ridership.

Researchers have found that reduced transit fare pass programs for university students are successful in increasing student transit use and reducing commutes by private automobile to campus, with limited operational costs imposed on transit agencies. But the success of these programs also depends on how they are administered.

Programs that provide universal coverage result in higher student participation and lower per student costs than programs that require students to opt in to, or purchase, a pass.

### *The role of this research*

Despite the known benefits of providing free or reduced transit passes to college and university students, there is no industry standard partnership model between universities and transit providers. A national survey of reduced transit fare programs for college and university students revealed significant differences in partnership models, funding sources, and budgets among programs (Yu and Beimborn 2018). While variations in pass programs may account for unique circumstances between specific academic institutions and partner transit agencies, discrepancies between partnership and funding structures also potentially limit state and federal funding assistance to these programs.

For example, in 2017 the Governor of California vetoed AB-17, a bill that would have funded a pilot program for free or reduced transit passes for students in the state's public colleges and universities, citing a large number of existing student pass programs and a need for a "fuller discussion on how local transit discount programs work and how any new ones should be paid for" (Holden 2016). In the same veto message, however, the Governor specifically identifies Metro as an agency with existing reduced-fare transit passes for students.

Additionally, while the *need* for increased transit use in the backdrop of declining transit ridership and increasing car ownership levels in Southern California may be clear, these trends also raise questions about the *relevance* of reduced transit fare pass programs. A flurry of literature on student transit passes in the 1990s and early 2000s reached conclusions about the relationships between student passes and transit ridership in a different economic and demographic context from the late 2010s. Is a program like Metro's U-Pass still a relevant tool for increasing student transit ridership? And, if U-Pass is successful in a region as infamously car-oriented as Los Angeles, could U-Pass serve as a model in California – and across the country – for reduced fare transit pass programs for college and university students? My research attempts to address these gaps in the literature by examining the performance of U-Pass since its introduction in 2016.

# Overview of LA Metro's U-Pass program

Metro is the largest public transit operator in the Los Angeles region and third largest in the United States, serving 384 million passengers in 2018. In 2016, Metro introduced a pilot for the Universal College Student Transit Pass (U-Pass), its reduced transit fare pass program for college and university students, with the expressed goal of increasing student transit ridership (Deming and Feliciano 2016). Metro administrators presented U-Pass as an improvement to the College/Vocational (C/V) and Institutional Transit Access Pass (I-TAP) reduced fare programs, which struggled to reach a large student population – only one percent of the 1.4 million public college students in Los Angeles County were actively participating in C/V or I-TAP passes in 2016 – and were no longer revenue neutral for Metro (ibid).

In 2018, Metro converted U-Pass into a permanent program, officially replacing I-TAP. The C/V pass remains, however, for students at colleges and universities that do not offer U-Pass. For a university to offer U-Pass, it first enters into a formal agreement with Metro. Yu and Beimborn (2018) provide a detailed overview of the mechanics of U-Pass agreements between Metro and participating institutions. Metro provides the institution with stickers that incorporate the regional transit fare payment platform (TAP) technology. Students affix these stickers to their student ID, essentially turning their IDs into transit passes (see Figure 1).[1] TAP technology allows Metro to track the number of rides students take per academic term.


Figure 1: A mockup of a U-Pass sticker on a student ID (Source: LA Metro)

When a college first enters the U-Pass program, Metro provides an estimate of student U-Pass ridership and pass costs to the institution based on existing ridership data. The university decides if, and how much, to subsidize passes, and schools are responsible for selling passes to students. Sales typically take place at the participating institution's campus bookstore. As of the spring of 2019, all participating institutions, with the exception of Rio Hondo College, require their students to opt in to U-Pass by purchasing a pass (as opposed to offering U-Pass as a universal benefit among the

[1] There are exceptions to how TAP technology can be incorporated into pass media. At UCLA, students enrolled in U-Pass are provided UCLA-branded TAP cards, and administrators at Santa Monica College are exploring incorporating TAP technology directly into student IDs.

student population). At Rio Hondo, the college charges a transportation fee to all students and offers U-Pass to all full-time students for no additional charge. Students at Rio Hondo must still opt in to U-Pass by signing up for the program and renewing the pass each semester.

After paying for their pass, students are able to take unlimited trips on Metro and partnering municipal transit agencies (e.g., Santa Monica Big Blue Bus, Culver CityBus) during the academic term. At the end of the term, Metro aggregates the number of rides taken by students and charges the university $0.75 per ride, $1.00 less than the standard cash fare. Metro transfers any fare revenue made on municipal services to the respective agencies. To match the price of the C/V program, Metro's invoice to universities is capped at $43 per student per month (Deming and Feliciano 2018).

How does this model of reduced transit fare pass program perform? A relatively young program, U-Pass raises questions about costs and service demand placed on Metro in exchange for increased ridership and student savings, specifically:

1. Has U-Pass increased transit use among college students at participating institutions?
2. If so, has increased service demand also increased operating costs for LA Metro?
3. How has U-Pass affected LA Metro fare revenue?

These questions are explored in the following sections.

# Data and methodology

I used a mixed methods approach to address the project's three research questions. In addition to the literature review on reduced transit fare pass programs, I used a variety of quantitative datasets from Metro and other sources. I also conducted informal interviews to supplement quantitative findings. In this section, I describe these data sources, the methodology for analyzing the data, and the limitations of these data and the research design.

## Data

In the winter of 2019, Metro provided four data sources to analyze the performance of U-Pass:

1. U-Pass census responses. When a student joins U-Pass, Metro requires the student to complete a census that records their student status, demographic information, and transit use. Student responses are anonymized and organized by individual schools. Metro provided a database of census responses from Fall 2016 through Summer 2018 with information on transit use (i.e., responses to "How many times a week do you take Metro?") and fare type before U-Pass (i.e., responses to "If you currently ride Metro, what type of fare do you use?").

2. U-Pass invoice summaries. U-Pass uses TAP technology, allowing Metro to observe the number of boardings among students at participating institutions by academic term. Metro aggregates the number of U-Pass participants and boardings by institution in an internal invoice database. Metro provided this database with information from Fall 2016 through Summer 2018.

3. Boardings by hour at select stops. Metro service planning staff provided average weekday boardings by hour before the introduction of U-Pass (during the fall of 2015) and after U-Pass (during the fall of 2017 and 2018), at transit stops adjacent to three U-Pass institutions: Pierce College, California State University (CSU) Los Angeles, and CSU Northridge.

4. Weekday vehicle revenue service hours. Metro service planning staff provided average weekday vehicle revenue service hours for individual bus routes serving stops adjacent to the three case study schools. These data similarly corresponded with the fall of 2015, 2017, and 2018.

Additionally, I incorporate three measures of transit accessibility and favorability of the built environment to support transit into my analysis to examine the relationship between transit quality and U-Pass participation. These measures include:

1. Access Across America, a measure of the number of jobs accessible by transit, developed at the University of Minnesota Accessibility Observatory (Owen and Murphy 2018).

2. AllTransit™ Performance Scores, a measure that considers the performance of transit through its connections to other routes, jobs accessible in a 30-minute transit ride, and the number of workers using transit to travel (Center for Neighborhood Technology 2019).

3. EPA Smart Location Index, an index that considers factors of the built environment (i.e., density of development, diversity of land use, street network design), accessibility to destinations, and demographic and employment statistics of a census block (U.S. EPA 2014).

Finally, I conducted informal interviews in February 2019 with Metro service planning staff identified by the project client as having worked with institutions that participate in U-Pass. Follow-up emails were exchanged with service planning staff through March 2019. These interactions shed light on valuable institutional knowledge on service planning and internal perceptions of U-Pass.

## Methodology

To determine if U-Pass has increased student transit ridership, I analyzed U-Pass invoice summaries and student census responses. These data sources allowed me to (1) observe the proportion of U-Pass riders who rode Metro prior to the program, and (2) compare previous self-reported transit use in the student census with actual boardings per student from program invoice summaries. To determine if U-Pass has increased operating costs for Metro, I analyzed boardings and vehicle revenue service hour trends at the three case study schools: Pierce College, CSU Los Angeles, and CSU Northridge. I then interviewed Metro service planning staff to determine how Metro has accommodated any increases in transit ridership at the case study institutions. Finally, to determine U-Pass' effect on fare revenue for Metro, I analyzed U-Pass invoice summaries, cross-referencing student census results for information on previous transit fare payment behavior.

## Research limitations

Some limitations to the data and methodologies used in this report should be noted. The new participant census responses are critical, yet imperfect, data for this research. These census results are self-reported and, as such, may not accurately reflect a student's previous transit use or payment behavior. Additionally, Metro staff have noted that not every student who takes the survey ultimately receives a transit pass. They may, for example, complete the census and decide not to purchase a pass. The inclusion of these students' responses in the census may distort my findings on previous transit ridership and payment behavior.

Finally, the second research question – examining the relationship between U-Pass, service demand, and operating costs – does not seek to find causation between U-Pass and operating costs, but rather provide a holistic understanding of ridership trends at participating institutions. The trend of increased (or decreased) boardings and operating costs at lines serving U-Pass institutions may be affected by factors other than the availability of U-Pass. Future research can improve on these limitations presented in these data sources and methodologies.

# Examining U-Pass data

## U-Pass participation profile

Despite industry-wide declines in ridership, U-Pass has seen notable growth since its inception in Fall 2016. From Fall 2016 through Spring 2018, U-Pass boardings increased 23 percent, while total Metro boardings decreased six percent (see Figure 2). As of the 2018 summer term, a total of 15 institutions across Los Angeles County partnered with Metro under U-Pass, and 45,000 students had participated in U-Pass. These students made a total 5.4 million trips, resulting in $4.3 million in revenue for Metro. The average U-Pass participant takes 6.6 Metro trips per week during their academic term.

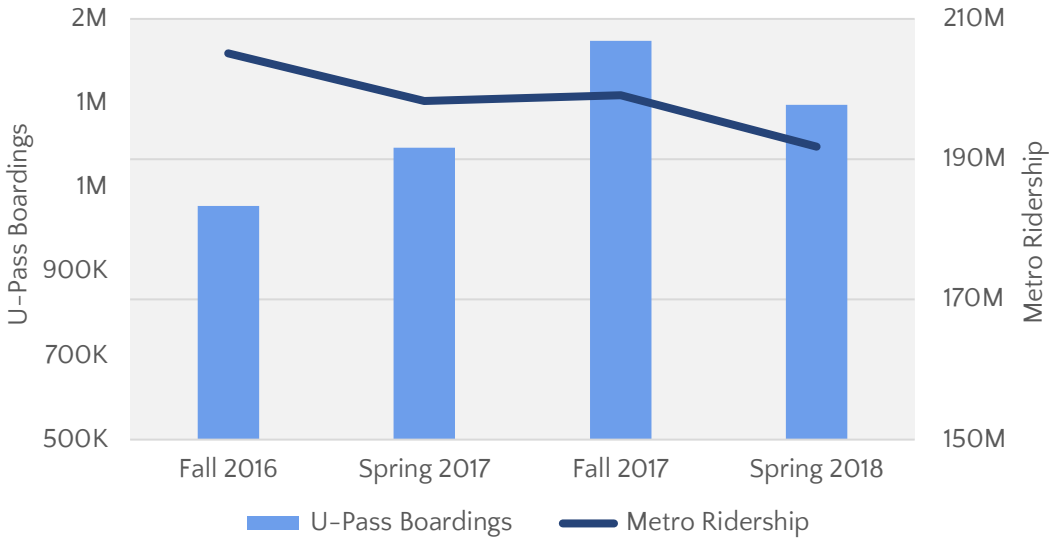



Figure 2: U-Pass boardings and total Metro ridership, 2016-2018

While U-Pass has seen notable growth, student participation varies drastically by institution. Participation can be measured by (1) the proportion of students participating in U-Pass and (2) the average number of boardings per participating student. What can explain these differences? First, the pass cost to students may be a factor. Schools determine if and how to subsidize U-Pass prices to students, resulting in pass prices that vary by school. Students may be unable or unwilling to pay for their college's pass as its price increases. Second, U-Pass institutions are located throughout Los Angeles County and, therefore, experience varying levels of transit service. Los Angeles Trade Technical College, for example, is located close to the core of Metro's service area in Downtown Los Angeles, while Mission College is located at the suburban fringe of Metro's service area in northeast San Fernando Valley. Students may be more willing to purchase a pass if they have better transit service options near campus.

## Participation and pass price

Using Spring 2018 U-Pass invoice data, I find a robust relationship between pass cost and student participation. The lower the cost of U-Pass, the more students participate ($R^2$ = 0.37, see Figure 3). At Rio Hondo College, where the cost of U-Pass was $9, one out of ten students opted into U-Pass. At Mission College, where the cost of U-Pass was $261, only *three* out of 5,000 eligible students opted into U-Pass.

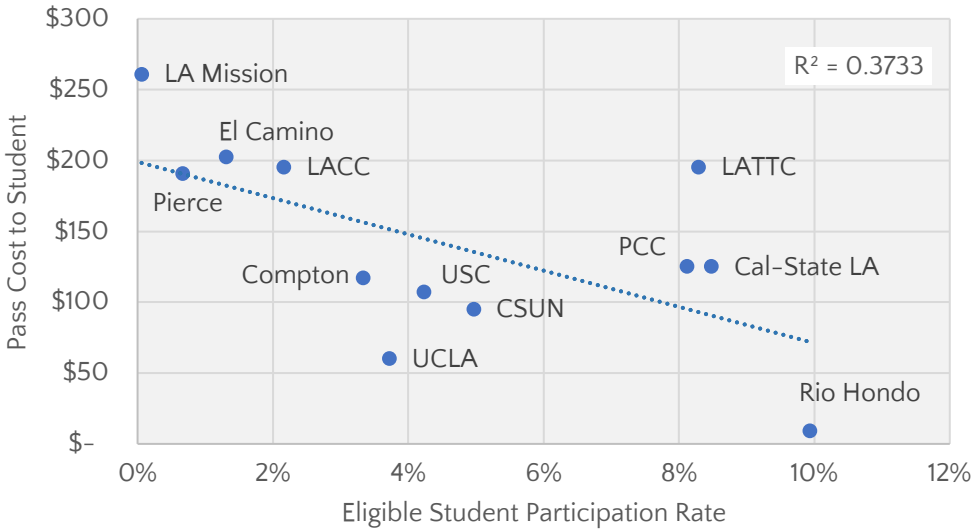



Figure 3: U-Pass cost and participation rates, Spring 2018

Additionally, as the cost of U-Pass increases, occasional riders are lost and the weekly boardings per participant increases ($R^2$ = 0.60, see Figure 4). At Rio Hondo, students took on average less than one roundtrip on Metro per week.[2] The $9 pass price there paid for itself in three roundtrips at Metro's regular fare. Students at Mission College, however, took on average one roundtrip six days of the week. They had a financial incentive to use Metro more frequently: At $261, the pass paid for itself after 75 roundtrips.

[2] Total public transit ridership among U-Pass participants at Rio Hondo was likely higher than what is reflected in Metro's data; Students may have used U-Pass to travel on partnering municipal transit agencies that also served the campus.

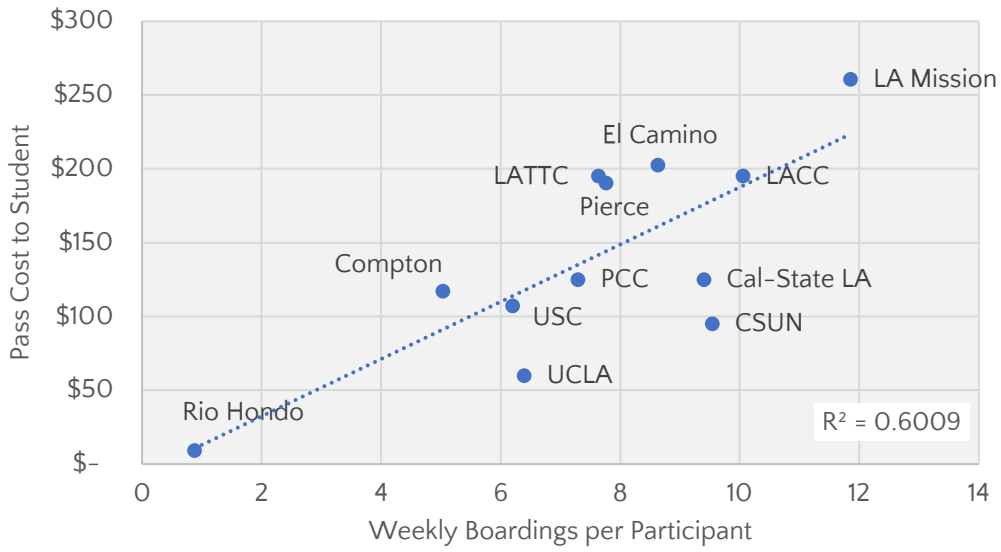



Figure 4: U-Pass cost and weekly boardings per participant, Spring 2018

## Participation and transit quality

I find relatively weak relationships between U-Pass participation and three measures of transit service quality and the favorability of the built environment to support transit service. The first, "Access Across America," measures the number of jobs accessible by transit (see Figure 5). Because unemployed full-time college students may not be influenced to use transit by their access to jobs, I analyze two other indices: AllTransit™ Performance Scores and the EPA Smart Location Index, which measure transit service quality and various factors of the built environment that support transit service, respectively.

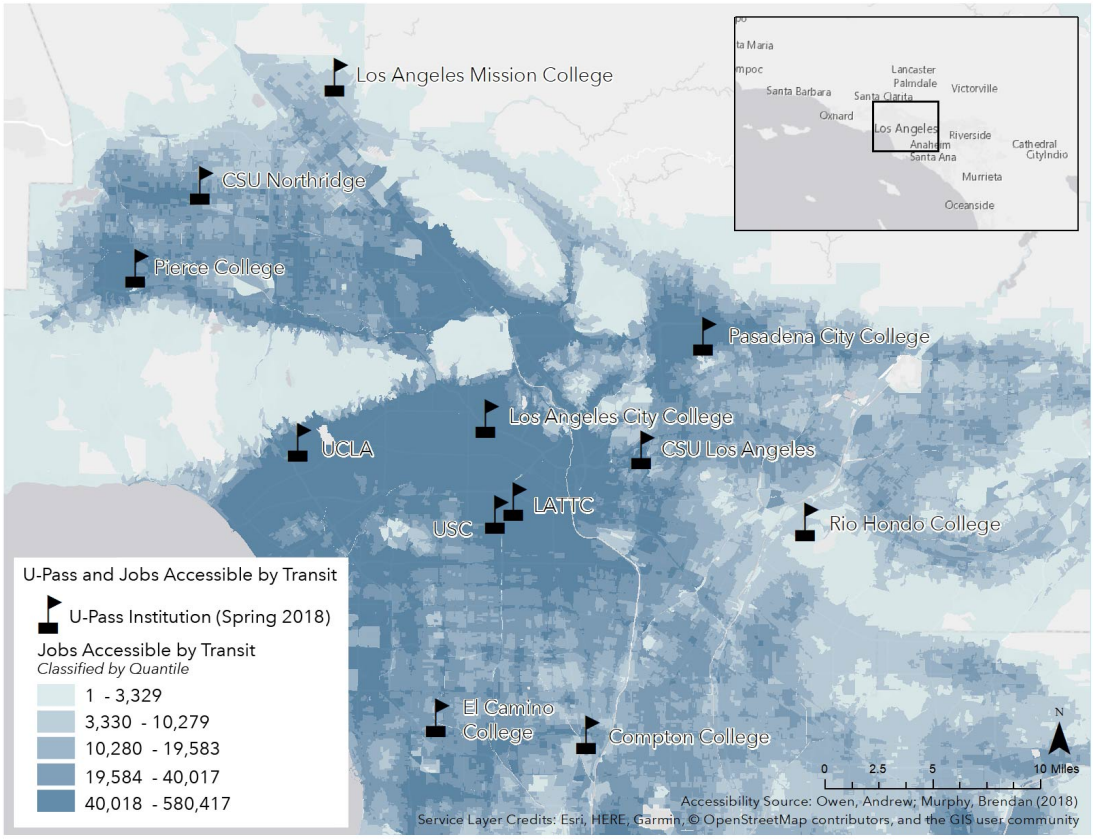



Figure 5: U-Pass institutions and jobs accessible by transit

With the exception of AllTransit™ Scores and the proportion of students who participate in U-Pass ($R^2$ = 0.25), all other analyses found relatively weak relationships ($R^2$ < 0.15) between these measures and U-Pass participation. The relationships between U-Pass participation and these measures are explored in more detail in Appendix A.

In summary, these analyses suggest a stronger relationship between student participation in U-Pass and the *price of the pass* than the *quality of transit* at the participating institution. Students are more likely to participate in U-Pass as the price of the pass decreases, not necessarily as transit quality improves. Additionally, I find evidence of adverse selection in student participation in U-Pass, where occasional riders are less likely to opt in to U-Pass as the price increases at their school.

## U-Pass and student transit ridership

Has U-Pass increased transit use among college students at participating institutions? Student transit pass programs can increase ridership in two ways: First, by increasing the *number of students* who take Metro, and second, by increasing the *number of trips* students take on Metro. Participant census responses suggest U-Pass has indeed increased the number of students who take Metro. Before U-Pass, 20 percent of participants did not ride Metro (see Figure 6).

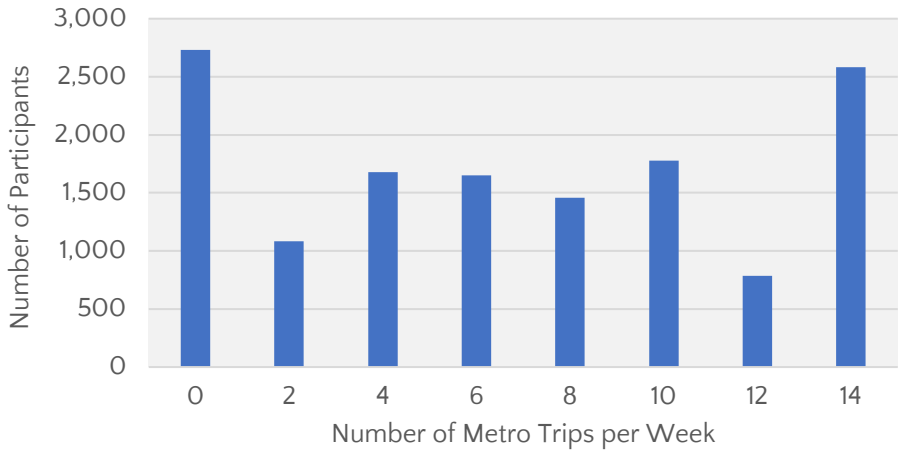



Figure 6: Self-reported number of Metro trips per week before U-Pass

This finding raises the question of the influence of the lifecycle effect among U-Pass participants. Some students who did not ride Metro before U-Pass may not have taken transit previously regardless of the presence of the program. For example, before participating in U-Pass, students may have been in high school and commuted to school by means other than Metro. This phenomenon is likely at play among some new riders, but determining to what extent students did not ride Metro previously because of a lifecycle effect is outside the reach of the available data.

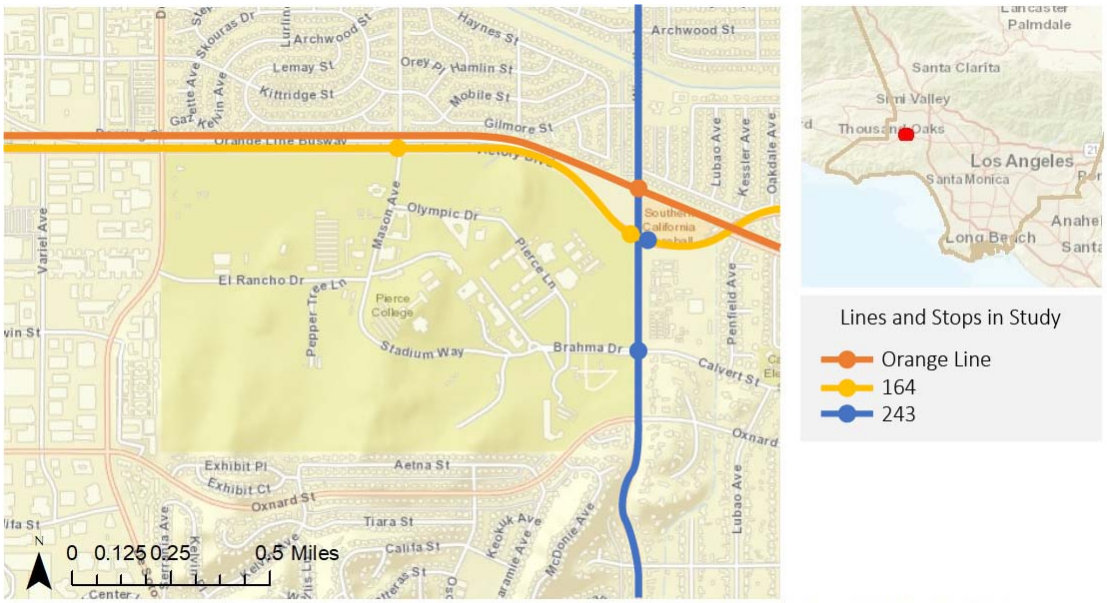
U-Pass invoice data suggest students take Metro at similar rates to their travel behavior before U-Pass. The average U-Pass participant takes 6.6 trips Metro trips per week, slightly less than the 6.8 trips per week before U-Pass reported in the new participant census. While the average number of trips per week decreased slightly under U-Pass, by three percent, the magnitude of this loss pales in comparison to the proportion of U-Pass participants who represent new Metro customers. Ultimately, the data suggest that U-Pass has met its intended goal of increasing student ridership, primarily by increasing the number of students who take Metro.

## Service demand and operating costs

Has service demand resulting from increased student ridership under U-Pass increased operating costs for Metro? The literature review suggests college students are more likely to ride transit in off-peak times, when crowding is less likely and transit providers are better able to accommodate new riders than in the peak. If Metro is able to absorb new riders without adding new service – especially during peak periods – the agency benefits from additional revenue with limited additional operating costs. Three case studies are used to examine the relationship between U-Pass, service demand, and operating costs: Pierce College, CSU Northridge, and CSU Los Angeles.

### *Case Study 1: Decreased service demand and operating costs at Pierce College*

Pierce College is served by Orange Line bus rapid transit and local service lines (see Figure 7). From 2015, the year before U-Pass was introduced at Pierce College, to 2018, overall weekday boardings at stops serving the college decreased 20 percent (see Figure 8). Boardings decreased at all hours of the day, including peak periods, with the exception of the 1:00 PM hour block. Lower boardings resulted in lower service provided by Metro; lines servicing Pierce College saw a seven percent decrease in weekday vehicle revenue service hours (see Figure 9). Even as Pierce College students joined U-Pass, service at the college still experienced declines in transit ridership and, consequently, operating costs.




Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Figure 7: Lines and stops serving Pierce College

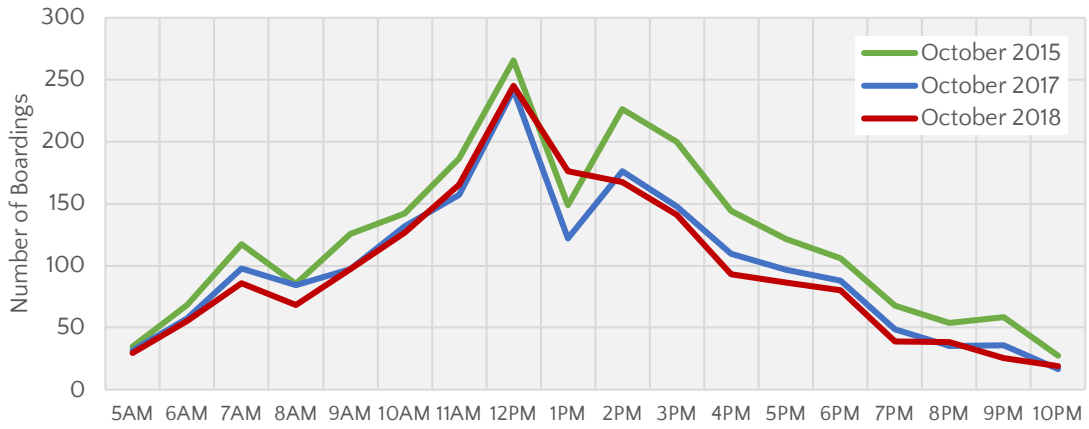



Figure 8: Average weekday boardings at Pierce College, 2015-2018

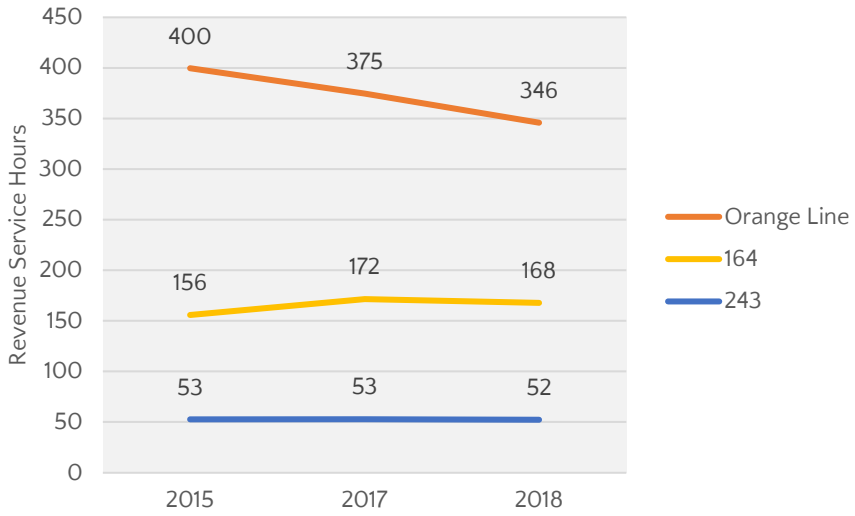
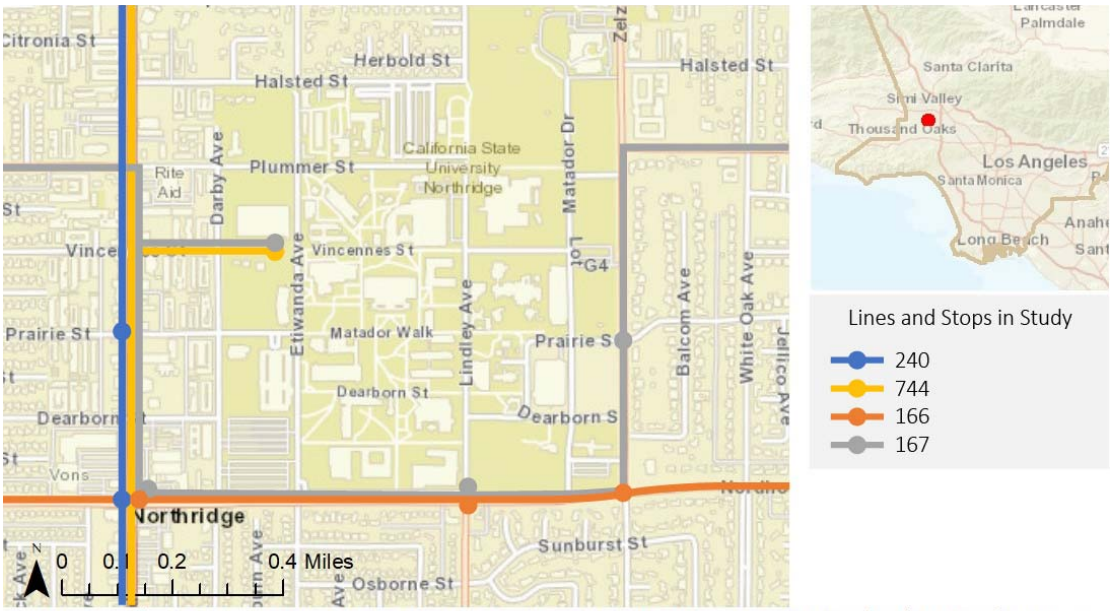



Figure 9: Weekday vehicle revenue service hours on lines serving Pierce College, 2015-2018

### *Case Study 2: Marginal changes in service demand and operating costs and CSU Northridge*

CSU Northridge is served by a local express Metro Rapid line and local service lines (see Figure 10). At CSU Northridge, weekday boardings at stops serving the campus have remained notably consistent throughout the day since the introduction of U-Pass in 2016 (see Figure 11). One exception is during the afternoon peak, at the 4:00 PM hour block, where boardings have increased 25 percent from 2015. In the aggregate, however, weekday boardings at the campus did not change; they decreased just one percent during this time. Operating costs also changed only slightly during this timeframe. Lines servicing the school saw under a one percent average increase in weekday vehicle revenue service hours (see Figure 12). As CSU Northridge students joined U-Pass, service at the college experienced at best marginal changes in transit ridership and operating costs.




Service Layer Credits: Sources: Esri, HERE, Garmin, USGS, Intermap, INCREMENT P, NRCan, Esri Japan, METI, Esri China (Hong Kong), Esri Korea, Esri (Thailand), NGCC, (c) OpenStreetMap contributors, and the GIS User Community

Figure 10: Lines and stops serving CSU Northridge

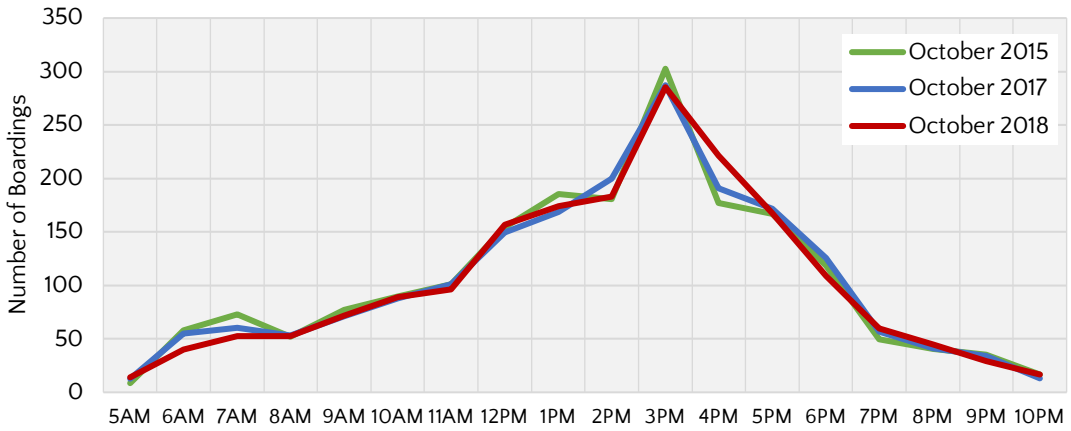



Figure 11: Average weekday boardings at CSU Northridge, 2015-2018

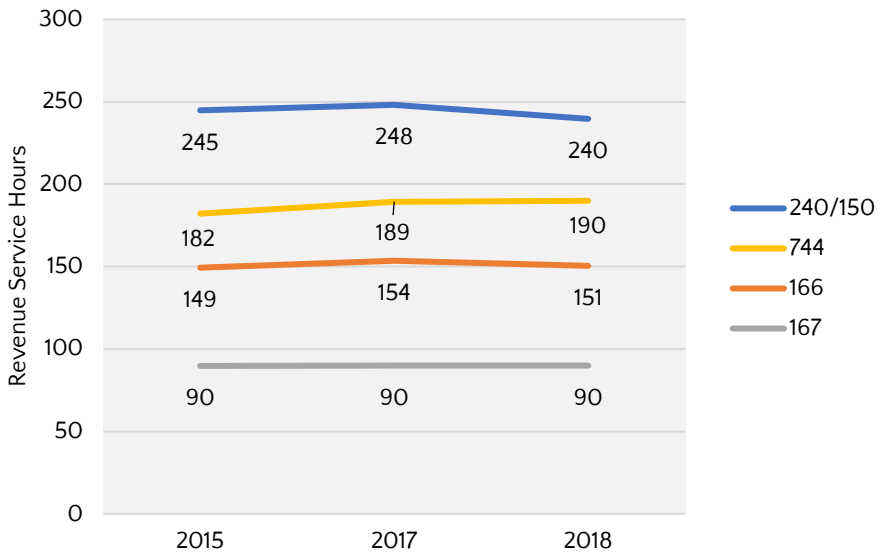



Figure 12: Weekday vehicle revenue service hours on lines serving CSU Northridge, 2015-2018

### *Case Study 3: Increased service demand and operating costs at CSU Los Angeles*

CSU Los Angeles is served by the limited-stop Silver Line bus service and local service lines (see Figure 13). From 2015, the year before the introduction of U-Pass, to 2018, overall weekday boardings increased 107 percent at stops serving the university (see Figure 14). There was significant growth in ridership in both peak and off-peak hours. At some hour blocks, ridership increased over 200 percent, resulting in complaints from CSU Los Angeles administrators about crowding on the Silver Line.

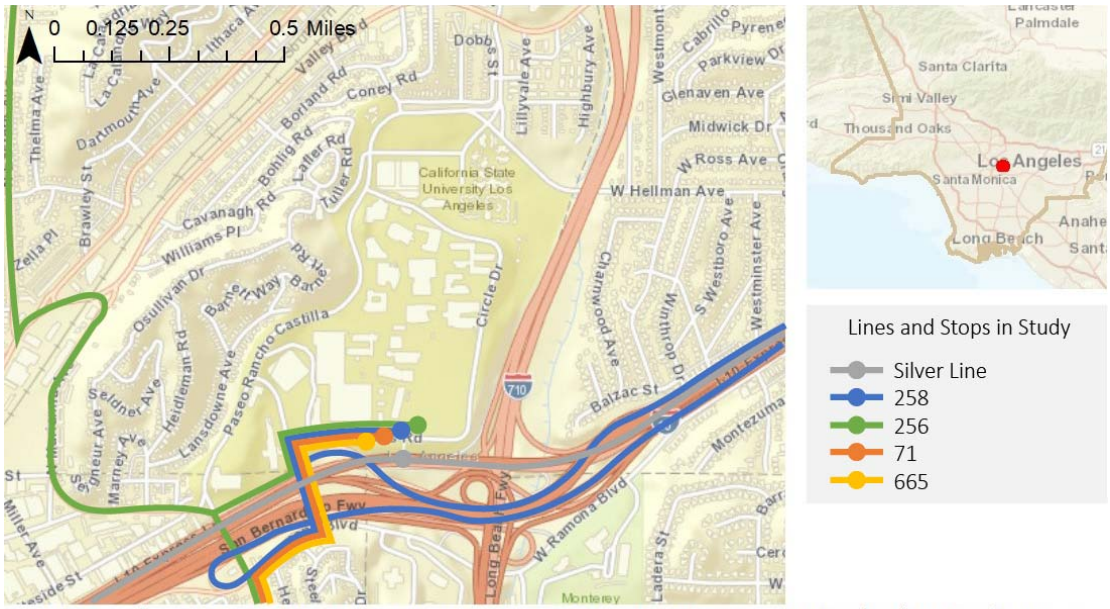



Figure 13: Lines and stops serving CSU Los Angeles

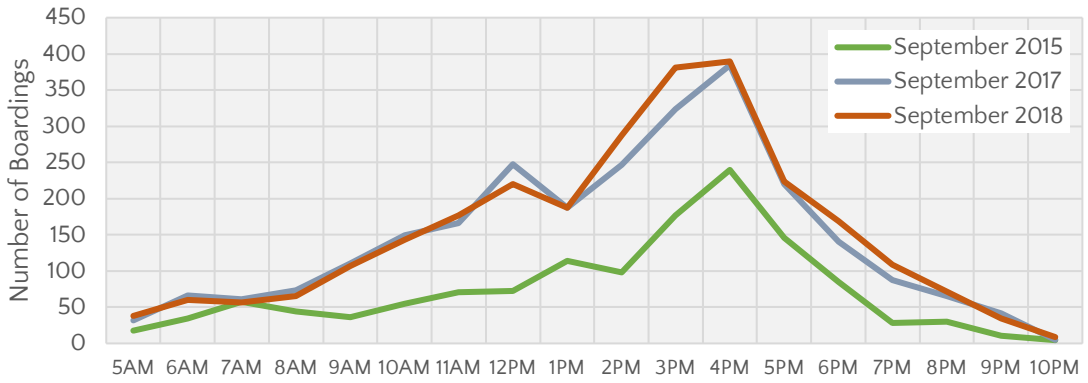



Figure 14: Average weekday boardings at CSU Los Angeles, 2015-2018

The Silver Line alone experienced a 117 percent increase in boardings from 2015 to 2018, from 755 total daily boardings to 1,637. Increased boardings on the Silver Line resulted in increased service provided by Metro; weekday vehicle revenue service hours grew by 30 percent during this time (see Figure 15). Local service lines experienced a 93 percent increase in boardings from 2015 to 2018, resulting in a 25 percent increase in service hours. Most of the increase in service hours on local buses can be attributed to the retirement of line 485 and its replacement with a new line, 258, in 2016. Metro's redesign of line 485 as 258 addressed an alignment issue (Hymon 2016), improving the attractiveness of the line for riders. When lines 485 and 258 are removed from this analysis, service hours on local service lines increased only three percent.

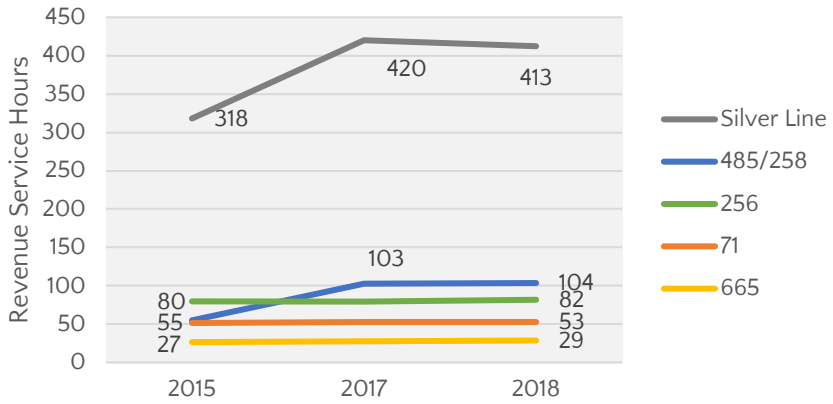



Figure 15: Weekday Vehicle Revenue Service Hours on Lines Serving CSU Los Angeles

The Silver Line plays a significant role in the growth in ridership seen at CSU Los Angeles, accounting for 63 percent of the increase in boardings at the campus. With frequent service to the regional transit hubs of Downtown Los Angeles and El Monte Station, the Silver Line is a more attractive service than, for example, local service lines. However, other campuses have access to high quality transit and have still experienced ridership declines. Pierce College, for example, is accessible by the Orange Line, but boardings at that bus rapid transit station decreased 26 percent from 2015 to 2018. Future research can examine in more detail the reasons for the growth in ridership at CSU Los Angeles.

Interviews with Metro service planning staff confirm that changes in operating costs for transit serving U-Pass institutions vary by institution, but are usually moderate. Describing the service changes near institutions necessitated by U-Pass, one service planner said: "[We may add] a couple of trips in the evening or [tweak] schedules to better meet class dismissals. [...] There has not been additional service load related [to U-Pass at] either CSU Northridge or Pierce College." Especially in the context of regional transit ridership decline, U-Pass generally has little effect on operating costs at the majority of campuses.

## Fare revenue

How has U-Pass affected Metro's fare revenue? As discussed earlier, U-Pass is successful in increasing student transit ridership, even in the face of declining regional transit ridership. This new ridership is promising for fare revenue. Revenue generated from new U-Pass riders may offset the losses resulting from existing riders taking advantage of U-Pass' lower per ride fare. However, while one out of five U-Pass participants previously did not ride Metro, one out of five participants previously rode Metro *a lot*, at least 14 times per week (see Figure 6). Furthermore, the majority of participants (55%) paid full transit fares before U-Pass, and a quarter of participants traveled under other pass program (see Figure 16).

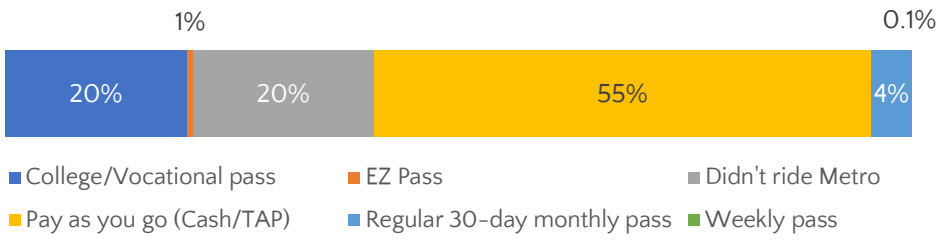



Figure 16: Student method of payment before U-Pass

While Metro *gains* $0.75 in fare revenue from each U-Pass trip made by a new rider, Metro *loses* $1.00 in fare revenue per ride among the 55 percent of U-Pass participants who paid full fares prior to the program. Metro loses fare revenue by varying amounts when U-Pass participants switch from other pass programs, as well (see Table 2 and Appendix B).[3] Because 55 percent of U-Pass participants report paying full transit fares before the program, the revenue generated from new riders does not recoup revenue losses resulting from existing riders taking advantage of the lower per-ride fare. For Metro to break even on U-Pass fare revenue based on students' previous ridership and payment behavior, the proportion of new riders would need to increase from 20 percent to 64 percent of the total U-Pass participant population.

Ultimately, Metro receives less fare revenue under U-Pass than it would under participants' previous travel and payment behavior. A representative group of 100 U-Pass students, for example, reduces Metro's fare revenue by nearly $10,383 per academic term (see Table 2 and Appendix B). When this estimate is applied to the Spring 2018 U-Pass population of 9,511 students, Metro may have lost nearly $1 million in fare revenue. As noted earlier, however, these findings should be taken with caution; Without incorporating the K-12 fare and previous rate of fare evasion, my analysis likely *overestimates* the revenue loss to Metro. And while $1 million may seem like a significant loss, Metro's total passenger fare revenue in Fiscal Year 2018 was $300 million (LA Metro 2018). Put another way, the revenue lost under U-Pass during a typical semester represent only 0.3 percent of Metro's annual fare revenue.

[3] Absent from the previous payment methods listed in Metro's participant census are (1) the Student K-12 fare and (2) no payment (i.e., fare evasion). Under the K-12 fare, high school students pay $1.00 per ride, which would result in a revenue loss of $0.25 per ride once students graduate to U-Pass. It is likely that some students paid K-12 fares prior to U-Pass and selected "Pay as you go" as their previous payment method. Without knowing the proportion of students who paid K-12 fares prior to U-Pass, however, I assume all "Pay as you go" participants paid the full $1.75 cash fare in my revenue estimates. Additionally, some students may have evaded the fare entirely before U-Pass. Although my revenue estimates do not account for fare evasion, Metro would gain $0.75 per ride by U-Pass participants who were previously evading fares.

| Previous Pass Type | Percent of Responses | Avg. Revenue per Term | Avg. U-Pass Revenue per Term | Difference in Revenue by Term | 100 Student Example |
|---|---|---|---|---|---|
| | A | B | C | D=C-B | E=D*(100*A) |
| College/ Vocational pass | 20.1% | $170.57 | $84.66 | -$85.91 | -$1,729.63 |
| EZ Pass | 0.6% | $523.60 | $84.66 | -$438.94 | -$280.86 |
| "I don't ride Metro" | 19.9% | $0.00 | $84.66 | $84.66 | $1,682.37 |
| Pay as you go (cash/TAP) | 54.9% | $242.46 | $84.66 | -$157.80 | -$8,662.90 |
| Regular 30-day monthly | 4.4% | $396.67 | $84.66 | -$312.01 | -$1,372.53 |
| Weekly Pass | 0.1% | $425.00 | $84.66 | -$340.34 | -$19.80 |
| Total | **100%** | | | | **-$10,383.35** |

Table 2: Estimate of U-Pass impact on fare revenue (see Appendix B for more information)

# Discussion

By one measure, U-Pass is a success: Metro has succeeded in its goal of increasing student transit ridership. Even in Los Angeles, a region popularly regarded as a "driving city," U-Pass has demonstrated that transit is a viable option for a sizeable population: college and university students. Metro estimates there are 1.4 million public college and university students in the county, and from 2009 to 2018, Metro lost 80 million transit rides annually. If one out of four students traveled three roundtrips on Metro each week during the typical semester (17 weeks), they would complete 36 million trips — nearly half of the annual ridership lost over the past decade. U-Pass is an important tool for addressing declining transit ridership in Southern California, and it can do so without significant increases in capital or – with few exceptions – operating costs.

However, U-Pass could be even more successful. The current "opt in" model of U-Pass applied at universities across the county means U-Pass is not truly "universal." By requiring students to purchase their pass, participating institutions are stifling the success of the program, and may be increasing their costs as well. Specifically, my analysis finds evidence of adverse selection taking place at U-Pass institutions. As frequent transit users opt in to the program, universities must raise the pass price – in lieu of subsidizing the program – to cover an increasing number of trips per rider. Occasional transit riders and students who do not currently ride transit are less likely to opt in to a pass as its price increases, creating a feedback loop of increasing prices and declining student participation. By pricing out occasional riders, the current application of U-Pass prevents the program from adding as many new riders to the system as it might.

Stifled participation from new and occasional transit riders results in fare revenue losses for Metro under U-Pass, as the revenue generated from a relatively small pool new riders does not recoup revenue losses resulting from existing riders taking advantage of lower the per-ride fare. For U-Pass to be more financially sustainable for Metro, additional new or occasional riders need to increasingly take part in the program.

# Policy recommendations

U-Pass has the potential to increase transit ridership for Los Angeles Metro in the face of regional and statewide declines in ridership. However, high pass prices discourage or prevent new and infrequent riders from opting in to the program, preventing the widespread adoption of transit among those students who would otherwise occasionally take transit. Additionally, under current participation rates, Metro may lose nearly $1 million in fare revenue per academic term, as most current participants report previously paying the full fare before U-Pass.

As it is currently administered, U-Pass attracts some new riders to Metro while losing revenue, raising an existential question for Metro: What's more important, ridership or revenue? With the right policy interventions, Metro may not have to choose between the two. My research findings suggest Metro and partnering institutions should lower the barriers for students to participate in U-Pass to (1) continue to increase student transit ridership *and* (2) mitigate or recoup the revenue lost from existing transit riders utilizing U-Pass subsidies.

## Recommendation 1: Colleges and universities should implement U-Pass as a truly universal program

The model of a transit pass – whether riders must opt in or are automatically enrolled — matters for transit participation and use. Rather than requiring students to opt in to U-Pass, which comes at a significant transaction cost for students, colleges and universities should automatically enroll students in U-Pass as part of their school enrollment. Automatic, universal enrollment in U-Pass would remove financial and logistical barriers for new and occasional riders to take Metro, and the program could be implemented at a relatively low cost per student.

Universal transit access could be introduced at institutions as yearlong pilots, paid for by a combination of student fees, parking fees, and general university funds. To increase the convenience of the program, the region's TAP technology used to access Metro and municipal transit providers should be incorporated into student IDs, turning these ubiquitous items into students' key to the county. Depending on the success of universal U-Pass enrollment at institutions, Metro may consider requiring institutions to implement U-Pass as a universal program in the future. Universal U-Pass access can also be marketed as a student benefit by participating colleges, potentially increasing the competitiveness of institutions vying for students.

## Recommendation 2: Metro should develop a U-Pass communications toolkit

In order for students to take advantage of U-Pass, they must understand what the program is and how it works. Individual schools are ultimately responsible for advertising U-Pass to their students. The quality of communications surrounding U-Pass varies drastically by institution, and colleges and universities could generally improve their marketing of U-Pass in order to increase transit ridership. Metro can develop a communications toolkit for institutions that includes standardized, vetted language about the program that can be incorporated into institutions' marketing materials. By making it easier for students to understand U-Pass, Metro and participating institutions can increase the transparency of the program and, potentially, increase ridership.

## Recommendation 3: Metro should secure state financial support for U-Pass subsidies

While Metro loses fare revenue under U-Pass, this loss is ultimately a small proportion of Metro's total annual fare revenue: a third of a percent. Still, in the backdrop of declining ridership, fare subsidies for students – many of whom would otherwise pay full fares – presents a challenging financial situation for Metro. Because increasing transit ridership is a priority of the state, the California State Legislature should provide Metro funding to support the continued fare subsidy to increase college and university student ridership.

One potential source of state funding for U-Pass is revenue from California's Cap and Trade Program auctions. Revenue from these auctions, which is distributed under the Greenhouse Gas Reduction Fund (GGRF), can be used towards projects that reduce greenhouse gas emissions and promote other environmental and public health benefits (Rabin, Callahan, and DeShazo 2015). Based on these criteria, U-Pass is a good candidate for funding under the GGRF.

# Conclusion

Against the backdrop of declining transit ridership in Los Angeles County and the State of California, U-Pass has the potential to cultivate a new generation of transit riders. In this report, I find that U-Pass is fulfilling its promise of increasing student transit ridership. More students take Metro under U-Pass. This increase in ridership generally results in limited impacts on operations: U-Pass' relationship with operating costs varies by institution, but is usually relatively modest. As Metro expands its transit infrastructure throughout the county in the long-term, U-Pass can increase ridership among college and university students without major capital investments in the short-term.

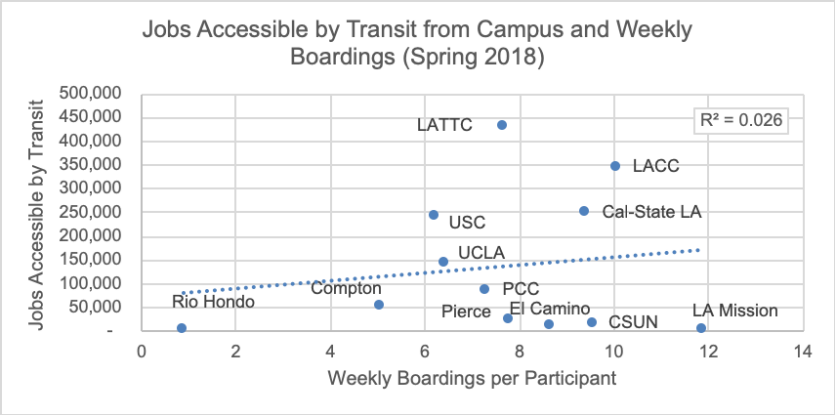
Increased ridership under U-Pass, however, does not translate to higher fare revenue for Metro. Because the majority of U-Pass participants previously paid Metro's full transit fare, and students generally ride as frequently as they did before joining the program, Metro receives less fare revenue under U-Pass than it would under participants' previous travel and payment behavior – even with the addition of new riders.

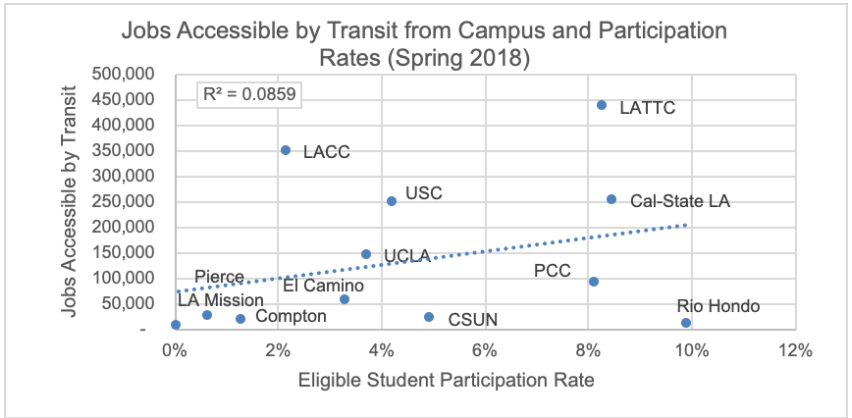
With thoughtful policy interventions, Metro will not have to choose between U-Pass ridership and revenue. My policy recommendations aim to lower the barriers to participate in U-Pass to (1) continue to increase transit ridership and (2) mitigate or recoup the revenue lost from existing transit riders utilizing U-Pass subsidies. These recommendations include applying U-Pass universally among student bodies, providing institutions a communications toolkit for better marketing U-Pass, and securing state funding for U-Pass subsidies. By better capturing new and occasional transit riders, Metro and its partnering academic institutions can support U-Pass in reaching its full potential in increasing student transit ridership, reinforcing U-Pass as a model program for transit agencies in California and across the country.

# Appendix A: Transit quality at U-Pass institutions and student participation

## Measure 1

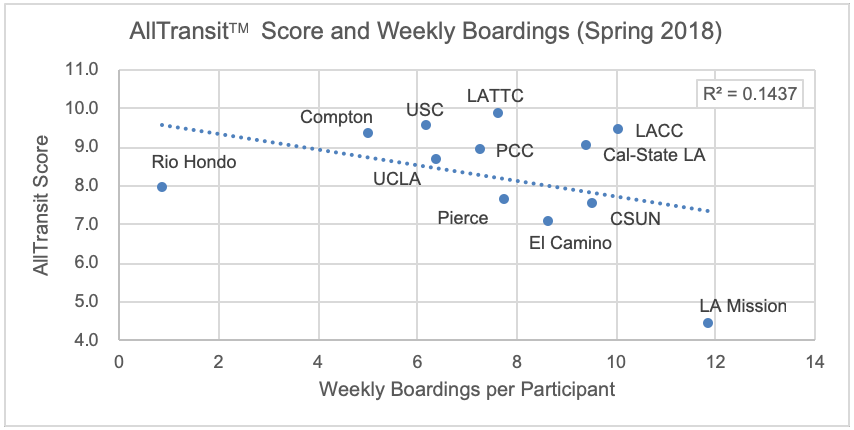
*Access Across America*, a measure of the number of jobs accessible by transit, developed at the University of Minnesota Accessibility Observatory (Owen and Murphy 2018).

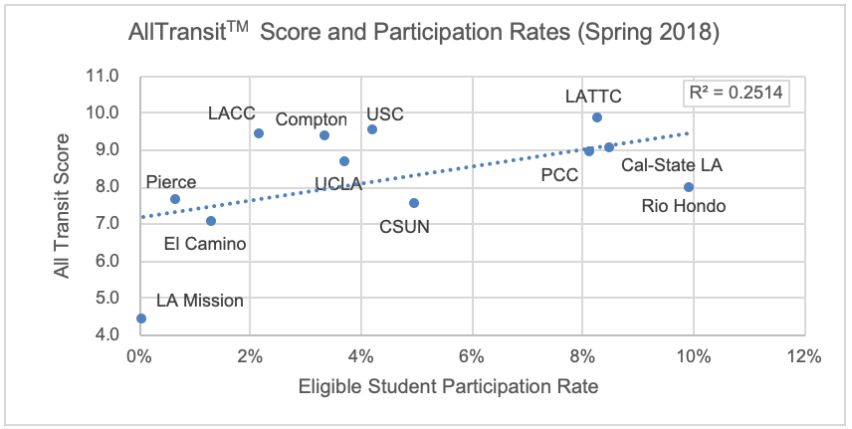


## Measure 2

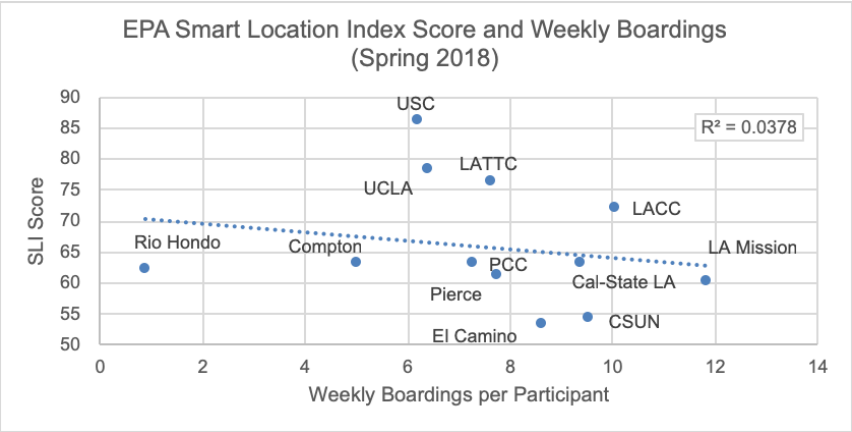
*AllTransit™ Performance Scores*, a measure that considers the performance of transit through its connections to other routes, jobs accessible in a 30-minute transit ride, and the number of workers using transit to travel (Center for Neighborhood Technology 2019).

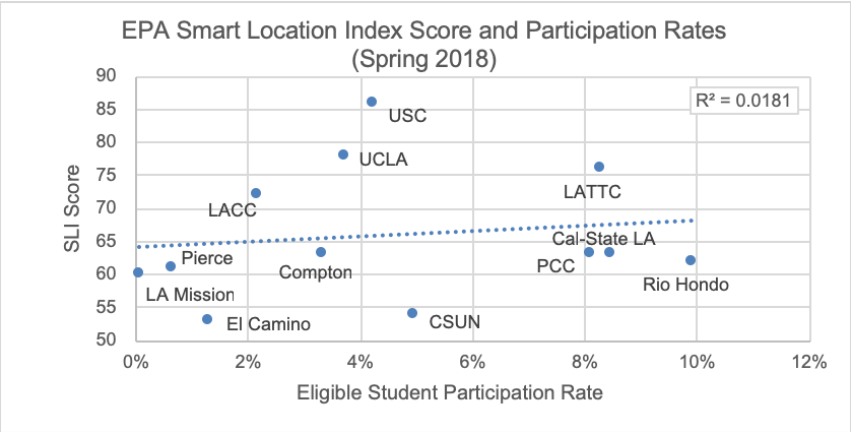


## Measure 3

*EPA Smart Location Index*, an index that considers factors of the built environment (i.e., density of development, diversity of land use, street network design), accessibility to destinations, and demographic and employment statistics of a census block (U.S. EPA 2014).



# Appendix B: Estimate of U-Pass impact on fare revenue

| Previous Pass Type | Percent of Responses | Avg. Trips per Week | Avg. Pass Revenue | Avg. Pass Revenue Time Unit | Avg. Pass Revenue per Week | Revenue per Trip | Revenue per Term[4] | Avg. Revenue per Term under U-Pass[5] | Difference in Revenue by Term | 100 Student Example |
|---|---|---|---|---|---|---|---|---|---|---|
| | A | B | C | D | E | F=E/B | G=E*17 | H=6.64*17*.75 | I=H-G | J=I*(100*A) |
| College/ Vocational pass | 20.1% | 9.02 | $43.00 | 30 days | $10.03 | $1.11 | $170.57 | $84.66 | -$85.91 | -$1,729.63 |
| EZ Pass | 0.6% | 10.02 | $132.00 | 30 days | $30.80 | $3.07 | $523.60 | $84.66 | -$438.94 | -$280.86 |
| I don't ride Metro | 19.9% | - | - | - | - | - | - | $84.66 | $84.66 | $1,682.37 |
| Pay as you go (cash/TAP) | 54.9% | 8.15 | $14.26 | 7 days | $14.26 | $1.75 | $242.46 | $84.66 | -$157.80 | -$8,662.90 |
| Regular 30-day monthly | 4.4% | 10.56 | $100.00 | 30 days | $23.33 | $2.21 | $396.67 | $84.66 | -$312.01 | -$1,372.53 |
| Weekly Pass | 0.1% | 10.25 | $25.00 | 7 days | $25.00 | $2.44 | $425.00 | $84.66 | -$340.34 | -$19.80 |
| Total | **100%** | | | | | | | | | **-$10,383.35** |

[4] The average typical academic term under U-Pass is 17 weeks

[5] Assumes participants take an average of 6.64 trips per week under U-Pass for 17 weeks, at $0.75 per trip

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